

Pressure Filtration



Larger Picture

Pressure Filtration is commonly used in large-volume filtration, and where careful control of pressure differential is necessary. It should be recalled, however, that the pressure on the gauge is not the same as the pressure differential across the system, since the downstream end of the device is exposed to atmospheric pressure (15 psi). Higher flow rates can be achieved with pressure filtration than with vacuum filtration, because the pressure differential can be increased as needed. The foaming that might occur in vacuum filtration does not occur with pressure filtration, making pressure filtration more desirable for filtration of proteinaceous liquids (for example, serum). Also, unintentional contamination downstream of the membrane filter is minimized with pressure filtration and pressure filtration is the only procedure that will permit direct sterile fill of bottles or ampoules directly from the filter. Pressure filtration is essential if the only procedure that will permit direct sterile fill of bottles or ampoules directly from the filter. Pressure filtration is essential if viscous solutions are being filtered or flammable liquids such as solvents, because vapor accumulation that might occur with vacuum does not occur.

The liquid to be filtered is generally held in a pressure can be generated either with a pump, compressed air or an inert gas such as N₂ (the latter is preferable). The downstream outlet is connected to a receiving vessel which should be fitted with an air filtration device at its outlet. Such filtration is essential if sterility is to be maintained because fluctuation in pressure or release of pressure at the termination of the filtration in pressure will cause temporary vacuum at the downstream end of the system, pulling external air into the system.

Membrane filter disks containing cellulose nitrate (either pure cellulose nitrate or mixed esters of cellulose) stick tenaciously to stainless steel, whereas cellulose acetate membranes do not. If filters containing cellulose nitrate must be used with stainless steel equipment, it is necessary to coat the surface with Teflon (PTFE) to prevent sticking.

Most manufacturers provide stainless steel holdeds that are Teflon coated, bit it should be noted that Teflon-coated surfaces must be cleaned with nonabrasive material such as a sponge to avoid eroding the Teflon coating.

With pressure filtration, filters can be set up in an array to provide for increased throughput. In a parallel filtration system a single stream feeds several filter devices simultaneously, each of which contains a filter of the same type, and the outlets of the filters are combined again. The total flow rate is equal to the sum of the individual flow rates. With parallel filtration, the differential pressure across filters can be lower, and the same differential pressure exists across each filter of the array. Since differential pressure will increase as clogging occurs, a suitable practice is to install a sufficient number of filter units to establish a low differential pressure at the beginning of the filtration process (2-3 psi). This serves to extend the filter life by utilizing its capacity slowly rather than by forcing contaminants deep into the pore of the filter. Parallel installation is commonly used with cartridge-type filters, and the filtrates are pooled for the final product.